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REMARKS/ARGUMENTS

This case has been carefully reviewed and analyzed in view of the Official Action dated 16 July 2003.

In the Official Action, the Abstract of the Disclosure was objected to for incomprehensibility. Accordingly, the Abstract of the Invention rewritten to remove the noted informalities is submitted herewith.

In the Official Action, the Examiner applied 35 U.S.C. § 112, first paragraph, to the Specification and directed Applicant to submit a Substitute Specification in proper idiomatic English and in compliance with 37 C.F.R. § 1.52(a) and (b) to replace the original Specification. Accordingly, a Substitute Specification in proper idiomatic English and in compliance with 37 C.F.R. § 1.52(a) and (b) is submitted herewith. The Substitute Specification incorporates corrections which are purely formal in nature and, therefore, does not introduce any new matter.

The Drawings were objected to under 37 C.F.R. § 1.83(a) for not showing every feature of the invention specified in the Claims. Specifically, the Examiner stated that the cylinder change-over switch recited in Claim 1 was not shown in the Drawings. It is believed that the Claims Amendments incorporated hereby now obviate the Examiner's objection to the Drawings.

In the Official Action, Claim 1 was objected to because of a minor informality found therein; Claims 1-7 were also rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Accordingly, Claims 1, 3-6 have been

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amended to now clearly set forth their recitations. Claims 2 and 7 have been canceled without prejudice or disclaimer of the subject matter thereof.

For all of the foregoing reasons, it is now believed that the subject Patent Application has been placed in condition for allowance, and such action is respectfully requested.

Respectfully submitted,

FOR: ROSENBERG, KLEIN & LEE

Jun Y. Lee
Registration #40,262

Dated: 10/16/2003

3458 Ellicott Center Drive, Suite 101
Ellicott City, MD 21043
(410) 465-6678

CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this paper is being facsimile transmitted to the Art Unit #2856 in the U.S. Patent and Trademark Office on the date shown below.

Jun Y. Lee

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--BACKGROUND OF THE INVENTION

1. Field of the invention

This invention relates to a tachometer used in a car, and more particularly, to a tachometer device with a projection light source changing the color of the generated light according to the rotational speed of the car engine, wherein the projection light source changes the color of the light when the rotational speed of the car engine reaches a predetermined value.

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2. Description of the prior art

In the auto racing, the shifting at suitable engine rotational speeds is an important factor for gaining maximum power as well as attaining sufficient racing speed. To determine the right moment to shift gear speeds, a racer has to read an instant engine rotational speed, which is quite a challenge while driving at high speed.

It would be highly desirable to provide racing cars with sufficient means to aid a driver to quickly and effortlessly ascertain the level of engine rotational speed.

SUMMARY OF THE INVENTION

It is therefore a purpose of this invention to provide a tachometer device for a car with a projection light source which switches between different colors of the generated light (such as red, green, blue, yellow, indigo-blue, purple, white) according to the rotational speed of the car engine (such as, for example, 1000 RPM or 500 RPM), so that the color of the generated light indicates to the car driver an instant rotational speed condition of the car engine, thus sufficiently simplifying the rotational speed reading procedure.

Another purpose of this invention is to provide a tachometer device with a projection light source, which has a presetting mode, when a user records in the memory of the tachometer device for a particular color of the light source corresponding rotational speed. The device memorizes the respective values of the speed corresponding to

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respective colors so that when the tachometer device is being reset or being re-initiated, said corresponding color-speed correspondence need should not be reset again.

According to the present invention, a tachometer device includes a microprocessor and a memory, and is provided with a projection light source which includes:

a switch device,

an electric-control loop, which receives a control signal from the microprocessor indicative of what color the light source has to generate. It also is used to receive the switch signal from the switch device when the speed has reached a predetermined critical value indicative of switching the color of the generated light; and

an RGB illumination device set, which receives a driving signal from the electric-control loop to generate light of a color corresponding to an instant rotational speed of the car engine.

These features and advantages of the present invention will be fully understood and appreciated from the following detailed description of the accompanying Drawings.

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BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a circuit block diagram of the tachometer device of the present invention; and

Fig. 2 a perspective view of the tachometer device of the present invention.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A tachometer device of the present invention allows the user to set-up a critical rotational speed value of a car engine to determine an optimum shift-switch time. In addition, the tachometer device records the condition of the highest rotational speed during car racing. The device of the present invention comprises: a meter body which covers all the components of the tachometer device; a microprocessor which is used to process input signals and to control the operation of the tachometer device; a functional selection operation device which is used by a user to set up correspondence between the speed values and colors of generated light, which are recorded in a memory device (through the functional selection operation device the user also can set up critical speed values at which gear shift is to be switched); and a cylinder changeover switch which could be used to select the cylinder type.

Referring to Fig. 1 a light source device 2 is coupled to the original tachometer circuit 1, wherein the light source device 2 comprises:

a switch device 21, which is used to output a switch signal (or a set-up signal) onto an electric-control loop 22 once a critical speed value is reached indicative of necessity to change the color of the generated light (the change of the color indicates to the driver an optimal time for gear shift switching);

the electric-control loop 22, which is used to receive the control signal from the micro-processor 11, and which is also used to receive the switch signal (or the set-up

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signal) from the switch device 21. The electric-control loop 22 processes the control signal from the micro-processor 11 which "indicates" to the electric-control loop 22 what color the instant rotational engine speed corresponds to. Also, the loop 22 is controlled by the switch device 21 to switch the color once a respective critical rotational speed value has been reached. Thus, in response to both the switch signal output from the switch device 21, and to control signal from the micro-processor 11, the electric-control loop 12 outputs the signal to the RGB illumination device set 23.

The RGB illumination device set 23, is positioned inside the meter body. It receives the driving signal from the electric-control loop 22 prompting the RGB illumination device 23 to change the color of the generated light to a color corresponding to an instant engine rotational speed, wherein R=red; G=green; B=blue; R+G=yellow; G+B=indigo blue; R+B=purple; R+G+B=white.

The electric-control loop 22 drives the RGB illumination device set 23 by means of synchronized light-mixing technique when a specific speed segment is recorded in the memory 12 in correspondence with a respective color. The rotating tachometer has a plurality of speed segments, and therefore can display light of various colors. The device can switch the color light source between the colors such as red, green, blue, yellow, indigo-blue, purple, white by means of the switch device 21. Under the control of the microprocessor 11 program, the color of the light generated by the light source 2 can be set up according to the rotating speed segment (such as, for example, one segment for

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1000 RPM or one segment for 500 RPM). In operation, the user first sets the speed segment and the corresponding color, as well as the rotational speed value (critical value) corresponding to the optimum time for shift switch, for example, at 500 RPM. Then, during the car race when the rotational speed is between 0-1000 RPM, the light source generates light of one color while when the speed is between 1000-2000 RPM, the light source 2 switches to another color. The color does not change until the speed reaches the critical speed value which is 500 RPM. Thus the user can easily recognize instant speed condition and perform the shift switching when the color of the light source changes.

Referring to Fig. 2, which is the perspective view of the tachometer device with the projection light source of this invention, the device includes a selection operation panel 31 on the tachometer 3, a display lamp as well as a plurality of press buttons 311 on the selection operation panel 31. The press buttons 311 can be used depending on the functional requirement. The user can directly utilize the press button 311 to set-up the rotational speed region segment and the corresponding color as well as critical rotational speed value.

The tachometer device with projection light source according to this invention has the following advantages in comparison with other traditional technologies:

1. The tachometer device with the projection light source variable according to the rotational speed utilizes the electric-control loop to drive the RGB illumination device set by means of which the device can switch the color of the light generated by the light source between red, green, blue, yellow, indigo-blue, purple, white under the control of the microprocessor program in correspondence to the rotational speed of the car engine.

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The color of the light can be changed to another color according to the rotational speed so that the user can easily recognize the instant speed condition during the high-speed driving.

2. The tachometer device with the projection light source variable according to the rotational speed has a memorizing mode of operation, when the user sets up the color of the light in correspondence with a respective segment of the rotational speed. The device will memorize all the default values, so that when the tachometer is to be reset or re-initiated, said corresponding color is not required to be reset.

3. The tachometer of this invention provides for the user the opportunity to select colors in correspondence with each segment of the rotation speed according to the user's preference in order to let the user to feel comfortable in recognizing the instant speed as well as for performing gear shifting at the best time.

Many changes and modifications in the above-mentioned embodiment of this invention can, of course, be carried out without departing from the scope thereof. Accordingly, to promote the progress in science and the useful arts, the invention is disclosed and is intended to be limited only by the scope of the appended claims.

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ABSTRACT OF THE DISCLOSURE

A tachometer device with a projection light source generating light of a color corresponding to an instant rotational speed of the car engine to indicate to a racer the best time for gear shift switching by changing the color of the generated light. The device includes a the micro-processor, a memory device where a color corresponding to a respective speed segment, as well as speed value critical for shift switch are recorded, and a light source device including a switch device, an electric-control loop and a RGB illumination device set. The light source device is controlled by the microprocessor to change the color of the generated light when the speed reaches the critical value.

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